Improvement Action	Benefit to natal Chinook	Benefit to Other (non-natal) Chinook	Benefit to summer chum, bull trout, other fish
Restore all three major deltas by removing agricultural levees and navigational structures that impede natural sediment and tidal processes in shoreline target areas 1,2,4 and 15 in Fig. E-6.5	Improved feeding, growth, refuge, osmoregulation and migration of all 4 life history types of all three natal populations	Improved feeding, growth, refuge and migration of other populations, especially Lake Washington and Duwamish	Improved feeding, growth, refuge, osmoregulation and migration of anadromous bull trout and other fish species
Restore all at risk pocket estuaries within the sub-basin, which includes Elger Bay, Triangle Cove, Livingston, Warm Beach, Tulalip Bay, Honeymoon Bay, Race Lagoon and Penn Cove	Improved feeding, growth, refuge, osmoregulation and migration of all 4 life history types of all three natal populations	Improved feeding, growth, refuge and migration of other populations, especially Lake Washington and Duwamish	Improved feeding, growth, refuge, osmoregulation and migration of anadromous bull trout and other fish species
Restore all shoreline restoration targets within the sub-basin (areas 7,8,13 and 14 in Fig. E-6.5)	Improved feeding and migration functions for all 3 natal populations	Improved feeding and migration for other populations	Improved feeding and migration for anadromous bull trout and other fish species
Re-create hydrologic connections of Skagit Bay to both Padilla Bay and Stillaguamish delta to restore access to South Georgia Straits/Padilla Bay/Whidbey sub-basins corridor for Chinook migrants from all populations originating in the Whidbey Basin and South Georgia Straits sub-basins	Improved migration functions for Snohomish, Stillaguamish and Skagit populations (addresses spatial structure and diversity VSP)	Improved migration for Duwamish, Lake Washington and Nooksack populations. (addresses spatial structure and diversity VSP)	Improved migration functions for anadromous bull trout and other fish species (addresses spatial structure and diversity VSP)
Conduct a prioritized cleanup of contaminated sediment hot spots and ongoing toxic discharges in the Everett Harbor area	Improve connectivity between the Snohomish delta and other landscape classes for sensitive life history types such as fry migrants		Improve connectivity between the Snohomish delta and other landscape classes for anadromous bull trout and other fish species

6.7 Hood Canal

1. Salmon Use

Chinook

This subbasin comprises the Hood Canal region, which includes two independent populations of Chinook:

- Skokomish
- Mid-Hood Canal

a) Juvenile

- Juvenile Chinook salmon of all four life history types from the Skokomish and mid-Hood Canal populations utilize this sub-basin for feeding and growth, refuge, physiological transition and as a migratory corridor (juvenile salmon functions).
- Juvenile Chinook salmon from non-natal populations (e.g., Elwha and Dungeness) utilize this sub-basin for feeding and growth, refuge, physiological transition and as a migratory corridor.
- Chinook are documented in, and may spawn in, numerous other Hood Canal streams including Dewatto River, Big Beef Creek, and Lilliwaup Creek.

b) Adult

- Sub-adult and adult salmon from Puget Sound populations utilize habitats within this sub-basin as a migratory corridor and grazing area.
- Adult Chinook salmon from non-natal populations (specifically, Elwha and Dungeness populations) also utilize this sub-basin

Other Listed Species (not comprehensively reviewed or assessed for this sub-basin)

- Chum salmon: Six natal populations (Big and Little Quilcene, Dosewallips, Duckabush, Hamma Hamma, Lilliwaup and Union) of the Hood Canal/Eastern Strait of Juan de Fuca Summer chum ESU emanate from this sub-basin.
- Bull trout (anadromous): The Olympic Peninsula Management Unit contains one core area in this sub-basin (Skokomish), comprised of two populations. It is believed that anadromous bull trout may inhabit this core area. A larger region adjacent to the Skokomish drainage provides important foraging, migration, and overwintering habitat for sub adult and adult anadromous bull trout (USFWS 2004). Currently, the extent of the Skokomish population's use of this sub-basin is not known, but bull trout have been observed, historically, in several Hood Canal tributaries (e.g., Quilcene, Dosewallips, Duckabush, and Hamma Hamma River) (USFWS 2004).

2. Ecological and Landscape Conditions

Food Web, Ecological Conditions

Hood Canal is a long fjord with five major rivers contributing freshwater input, and contains a shallow east-west sill south of the Hood Canal Bridge, considerably more shallow than the areas immediately north or south of the sill (Fagergren et al, 2004). The natural geography of the region lends itself to an elevated natural sensitivity to nutrient input, due in part to slow flushing rates and the degree of stratification. As early as the 1950s, portions of Hood Canal experienced low dissolved oxygen levels, but since that time conditions have worsened (Fagergren et al, 2004). Persistent and worsening water quality problems, specifically low dissolved oxygen in the southern portion of Hood Canal continues to plague the ecosystem. Data from the 1990s revealed longer periods of time with biologically critical D.O. levels, hypoxic conditions, with low D.O. conditions possibly spreading to north Hood Canal (Fagergren et al, 2004). A pronounced and lengthy period of hypoxia in 2002 preceded a spring fish kill in 2003, followed by a widespread kill in the fall of 2003 (Fagergren et al, 2004). Dissolved oxygen levels during the winter of 2004 in south Hood Canal were the lowest on record (Fagergren et al, 2004).

The low D.O. conditions in Hood Canal may be a larger issue or problem for incoming adult salmon in the late summer or fall, rather than juvenile outmigrants because of the timing of hypoxic conditions. Forage fish, invertebrates like shrimp and octopus, rockfish and many other species are susceptible to mortality from hypoxia.

Harbor seal predation on returning adult salmon off the mouths of the Quilcene, Dosewallips, Duckabush, and Hamma Hamma river systems has been observed in 1998-2001. Seals were observed consuming summer chum, coho, and fall chum in all four years of observation. (VanBlaricom, et al, 2004) Additional surface observations were conducted in the fall of 2003 in order to assess the impact of an apparently large removal of seals by transient killer whales in Hood Canal during the winter of 2003. Although observations initially suggested major reductions in seal numbers, a more thorough evaluation of seal survey data suggests that the population-scale effect of the whale foraging event on harbor seals was small, and possibly even insignificant. This surprising result has led to reevaluation of broadly accepted assumptions about the metabolism and foraging ecology of transient killer whales, and suggests resilience of harbor seal populations to episodic attacks by predators. (VanBlaricom, et al, 2004)

Landscape Conditions

The shorelines of Hood Canal are a combination of low banks, sandy bluffs and rocky shorelines reflecting the complex geology of this fjord. The shorelines are punctuated by many stream and river mouths with broad deltaic fans, the largest of which is the Skokomish natal delta. The influence between these deltaic sediment sources and longshore sediment drift processes creates a shallow subtidal shelf in many areas that support extensive eelgrass patches. Between the patches is an almost continuous band of eelgrass along the steeper shorelines. A long history of Japanese oyster culture in Hood Canal resulted in the upper intertidal zone being almost completely colonized by living oysters or covered in empty oyster shells. The effect this cover has on the distribution of native plant and animal communities on beaches within Hood Canal is unknown.

The linkages between watersheds and natal and other estuaries are important to salmon as they move from freshwater to open marine waters (Simenstad 2000a). The estuaries, whether natal Chinook or summer chum estuaries, other estuaries with documented use by Chinook, summer chum, or bull trout, or pocket estuaries, are what Simenstad (2000a) refers to as “patches,” dispersed along the shorelines of Hood Canal. The connection between all estuaries is important to summer chum and Chinook salmon. Summer chum salmon in this sub-basin are especially dependent on eelgrass beds (Simenstad 2000a).

See Figures E-7.1 through E-7.5 in Appendix E for additional information about landscape conditions in Hood Canal.

Overall area

- Total area (deep-water plus nearshore) is 85,888 acres (134.2 square miles).
- Deep-water portion (marine waters landscape class) comprises 62,784 acres (98.1 square miles), or 73% of the total sub-basin area.

Nearshore area

- Nearshore portion comprises 23,104 acres (36.1 square miles), or 27% of the total sub-basin area. As part of the nearshore, the Skokomish estuary is a natal estuary (landscape class) for the independent Chinook populations listed above, comprising 2.96 square miles (8%) of the total nearshore area within this sub-basin.
- Nearshore area within this sub-basin is 5% of the nearshore area of the entire Puget Sound basin.
- Contains 203 miles of shoreline (beaches landscape class).
- The "key" bays (landscape class) identified in this sub-basin are Seabeck Bay, Stavis Bay, Dewatto Bay, Tahuya, Annas Bay, Lilliwaup Bay, Pleasant Harbor, Jackson Cove, Dabob Bay, Fishermans Harbor, Thorndike Bay, and Squamish Harbor.
- Fifty-eight linear miles (29%) of the shoreline is designated as marine riparian (defined as the estimated area of length overhanging the intertidal zone).
- In this sub-basin, 77% of the shoreline (156 linear miles) has eelgrass (*Zostera marina* and *Z. japonica*); may be patchy or continuous.
- In this sub-basin, floating kelp does not occur. In this sub-basin, 10% of the shoreline (21 linear miles) has non-floating kelp; may be patchy or continuous.

Pocket Estuary Analysis

We identified 39 pocket estuaries in this sub-basin. We analyzed these estuaries with Chinook salmon in mind: Using the Duckabush River as an approximate mid-point of this sub-basin, 15 pocket estuaries are located south of this point (most south of Hoodsport), and 24 are located north of the Duckabush River and relatively evenly distributed along both shorelines.

- Freshwater sources were observed in nearly three-quarters of the pocket estuaries,
- Based on the assumptions listed in Appendix B, all three of the Chinook functions (feeding, osmoregulation and refuge) were estimated to occur in 21 of the 39 pocket estuaries. Most of the remaining pocket estuaries were estimated to have two of the three Chinook functions,
- Eighteen pocket estuaries were estimated to be *properly functioning*. Seven pocket estuaries were estimated to be *not properly functioning*. The remaining pocket estuaries were recorded as *at risk*.

Drift Cell Analysis

Several long stretches of shoreline in northern and eastern Hood Canal remain unarmored and are expected to have high natural function of drift cell processes. The southern and western shorelines are almost completely armored by single family residential and commercial property bulkheads. A drift cell characterization for this sub-basin is presented in Appendix E, Figure E-

7.5 and subsequent text. Littoral drift, feeder sources, deltaic processes, deposition, and recommendations for protection and restoration are discussed in Appendix E and highlights of recommendations for protection and restoration are included in Tables 6-14 and 6-15.

Threats/stressors

Loss and/or simplification of delta and delta wetlands

Comparison of historical wetland area and wetland area reported in Bortleson et al. (1980) revealed that for the Skokomish delta, the estimated area of subaerial wetlands decreased from historical to date of survey in 1980 from 0.81 to 0.54 square miles (decreased by 0.27 square miles). The estimated area of intertidal wetlands decreased from historical to date of survey in 1980 from 1.93 to 1.73 square miles (decreased by 0.20 square miles).

Jay and Simenstad (1996) compared pre- and post-diversion surveys and suggested deposition has occurred on much of the inner delta and erosion on much of the outer delta. Many of the historical bathymetric change cross-sections revealed a steepening of the delta surface, apparently "caused by a loss of sediment transport capacity in the lower river and estuary combined with steady or increased (due to logging) sediment supply." In addition, a 15-19% loss of "highly productive low intertidal surface area" habitat between 0.6 m below MLLW and 0.6 m above was observed, as well as an estimated 17% decrease in area of eelgrass beds. A decrease in the amount of mesohaline mixing habitat was reported. Habitat losses in the Skokomish River basin are similar to those reported in other regions containing larger river basins experiencing water withdrawals of the same scale.

Alteration of flows through major rivers

Due to two dams on the Skokomish River, 40% of the annual average freshwater flow is diverted for power production and never reaches the delta (Jay and Simenstad 1996). Freshwater flow from the North Fork Skokomish River is mostly re-routed and does not contribute to mainstem flow contributions to the estuary (USFWS 2004). Sediment transport "is a critical link between fluvial alterations and the remote downstream, estuarine consequences thereof" (Jay and Simenstad 1996). Changes in habitat function and physical processes must be considered when evaluating estuarine effects of human-caused modifications.

Both dams have had lasting impacts on water quality and connectivity in the Skokomish River system and Hood Canal (USFWS 2004). Sediment transport capacity, available habitat, and channel capacity has been reduced, and flooding has become more frequent (USFWS 2004).

Modification of shorelines by armoring, overwater structures and loss of riparian vegetation/LWD

The projected population growth in Mason, Kitsap and Jefferson counties between 2000-2025 is 52% (25, 683 people), 43% (99,602 people), and 55% (14,508 people) respectively (PSAT 2004). In this sub-basin, shoreline armoring occurs along 63 miles (32%) of the shoreline. Over 40 miles of shoreline are classified as 100% armored. Over 107 miles are classified as 0%

armored. The total number of overwater structures is 1,448, consisting of ramps (159), piers and docks (264), small slips (1,017) and large slips (8). Overwater structure are concentrated in the southern most region of Hood Canal. Railroads are not present.

Contamination of nearshore and marine resources

Regions with 15% or greater impervious surface area occur in Mason County near the terminus of Hood Canal, and sporadically along the western shoreline of Hood Canal north into Dabob Bay (PSAT 2004). In this sub-basin, nitrogen and organic material from various sources contribute to eutrophication, promoting excessive and rapid algal growth. Upon decomposition of algae, microorganisms can deplete the available oxygen in surrounding waters (Fagergren et al, 2004). Six primary categories of "human-influenced nitrogen sources" have been identified, totaling between 86 and 319 tons per year: Human sewage from onsite systems (39-241 tons); Stormwater runoff (12-24 tons, including lawn fertilizers); Chum salmon carcass disposal (16-24 tons); Agriculture – animal waste (18-22 tons); Forestry (0.5-5 tons); and Discharges from point sources (0.3-3 tons) (Fagergren et al, 2004).

Geographic source locations for each of the categories of nitrogen are as follows (from Fagergren et al, 2004): Human sewage (onsite systems) and stormwater runoff sources correspond to the populated regions of Hood Canal (Figure E-7.2). Chum salmon carcass deposition occurs primarily in the Skokomish River estuary. Agriculture (animal) waste occurs primarily in the Skokomish and Union watersheds. Fertilization in forestry practices occur in the southern half of Hood Canal on private forestlands, as well as on USFS lands throughout the sub-basin. Discharges from point sources occur in various forms and are located throughout Hood Canal. The 303D points are concentrated in the area from Union to Belfair; general industrial sources are concentrated in the Belfair region and Quilcene Bay, and a few other locations spread around the Canal.

Alteration of biological populations and communities

Nine hatcheries operate in this sub-basin (State, Federal, Tribal) as well as 12 small private salmon production operations (USFWS 2004).

Transformation of land cover and hydrologic function of small marine discharges via urbanization

Figure E-7.4 provides a list of pocket estuaries and stressors noted from review of oblique aerial photos.

Transformation of habitat types and features via colonization by invasive plants

Spartina spp are not found in this sub-basin. However, 45% of the shoreline (92 miles) contains *Sargassum muticum*, which may be patchy or continuous.

B. Evaluation

In this section we list goals and evaluate the level of realized function for natal and non-natal Chinook, summer chum, and bull trout. From this we then list each of the proposed protection and restoration actions for this sub-basin, and describe the benefits to natal Chinook, non-natal Chinook, and summer chum and bull trout (if any).

Goals for listed salmon and bull trout whose natal streams are in this sub-basin

a) Provide early marine support for all four life history types (fry migrants, delta fry, parr migrants, yearlings) of the Skokomish Chinook salmon population emanating from this sub-basin. Provide early marine support for Chinook populations emanating from other estuaries (e.g., Dosewallips, Duckabush, Hamma Hamma, and others – See list in 1 a) and b))
b) Provide support for sub-adult and adult Chinook salmon populations utilizing habitats within this sub-basin as a migratory corridor and grazing area.
c) Provide early marine support for the six Hood Canal/Eastern Strait of Juan de Fuca Summer chum salmon populations emanating from this sub-basin
d) Provide marine support for sub-adult and adult anadromous bull trout populations within the Skokomish core area in this sub-basin
e) Provide for connectivity of habitats; also, adequate prey resources, marine foraging areas, and migratory corridors for juvenile, sub-adult and adult Chinook, Hood Canal/Eastern Strait of Juan de Fuca Summer chum, and bull trout.
f) Provide early marine support for independent spawning aggregations occurring in this sub-basin.

Goals for listed salmon and bull trout whose natal streams area outside this sub-basin

a) Provide for some non-natal Chinook use: Elwha and Dungeness fish are known to use this sub-basin.
b) Provide support for all neighboring Puget Sound populations (juveniles, sub-adults, and adults) that utilize nearshore and marine regions of this sub-basin as a migratory corridor.

Realized function for listed salmon and bull trout

Fry migrant Chinook – Fry migrants from the Skokomish independent Chinook salmon population can derive function from the mostly low wave energy shorelines and nine pocket estuaries within five and ten miles of the Skokomish natal estuary (Figure E-7.2). Many of the pocket estuaries provide the opportunity to rear, osmoregulate and seek refuge in the shallow water, low-velocity habitats, however nearly half of these pocket estuaries are also at risk of losing this ability due to the presence of stressors (see Figure E-7.4). The majority of properly functioning pocket estuaries occur well outside and to the north of the 10-mile buffer of the Skokomish delta. Again, connectivity between habitat types and landscape classes, including intact freshwater "lenses" (or bands) along shorelines, is essential for small-sized fry migrants emerging from the Skokomish delta in search of rearing and refuge locations, and satisfying osmoregulatory requirements.

In addition, water quality (dissolved oxygen), water quantity (Cushman dam) and shoreline armoring/development are three factors that have the potential to impact the fry migrant's ability to emigrate to desired habitats outside the Skokomish estuary.

Delta fry Chinook – The net loss of intertidal wetlands within the Skokomish delta from historic conditions is relatively small (0.27 mi^2 or 124 acres) (Bortleson et al., 1980). Consequently, the opportunity for Chinook salmon delta fry to access delta habitat is available, and scheduled to improve with the advent of some dike removal to expose additional delta habitat. The Skokomish estuary has the potential to produce large numbers of Chinook salmon delta fry, as well as Hood Canal/Eastern Strait of Juan de Fuca Summer chum salmon (discussed below). Reversing the persistent poor water quality conditions in south Hood Canal (e.g., dissolved oxygen) is a key step to salmon recovery in this sub-basin. The water quantity issues and shoreline armoring/development described above also impact this life history type. Connectivity of habitat types and landscape classes is again, critical to delta fry.

Parr migrant Chinook – Many of the Puget Sound Chinook salmon migrate to the ocean as sub-yearlings (Myers et. al., 1998), and on average this life history type is the most abundant in Puget Sound. The opportunity exists for parr migrants from the Skokomish Chinook salmon population, and from populations in other estuaries (e.g., Hamma Hamma, Duckabush, Dosewallips) as well as Hood Canal/Eastern Strait of Juan de Fuca Summer chum salmon to derive function from habitats nested within shorelines. The numerous bays and eelgrass bands in this sub-basin may provide a valuable resource to this life history type as they emigrate north toward the Strait of Juan de Fuca.

Yearling Chinook – Any reduction in capacity as a result of non-support of the other life history types (i.e., primarily parr migrants) within this sub-basin will negatively affect yearling migrants. Connectivity between habitat types and landscape classes is very important to yearlings from the Skokomish Chinook salmon population and the Hood Canal/Eastern Strait of Juan de Fuca Summer chum populations (discussed below), as well as other populations moving about broadly within Puget Sound. Yearling migrants will be exposed to the same types of stressors and ramifications as described in the other sections above. Yearling migrants can derive functions (e.g., foraging, refuge, migratory pathway) from available nearshore habitats as described above. Of particular concern is the poor water quality plaguing this sub-basin, and while outmigrating yearlings may be less impacted than returning adults (or sub-adults) due to the timing of low D.O. events, this life history type is nonetheless at risk of ever increasing D.O. problems.

Sub-adult and adult Chinook – Sub-adult, and especially adult Chinook are likely to face an increasing problem when returning to Hood Canal to spawn in freshwater systems in the fall. This time of year corresponds annually to the lowest D.O. levels in southern Hood Canal, and as mentioned in earlier sections, the spatial and temporal trends are increasing northward and occurring earlier in the year. Other factors related to depressed D.O. conditions, and potentially impacting sub-adults and returning adults focus on the food web: available prey items, contaminated food chain, among others.

Listed summer chum – Six natal populations emanate from this sub-basin. As young fry in Hood Canal, summer chum remain close to shore in shallow surface waters while rearing in estuarine habitats, but after a short period of time larger fish can move offshore into open marine waters, even crossing Hood Canal (Simenstad 2000a). Smaller estuaries other than the natal estuaries listed in 1 b) are important to juvenile chum, termed subestuaries by Simenstad (2000a), but pocket estuaries in this analysis. These estuaries, or "patches" occur at irregular intervals along the shoreline of Hood Canal, and some of these can be viewed in Figure E-7.4. Eelgrass is very important as habitat for juvenile summer chum and it is probable that eelgrass is the principal migratory corridor linking estuaries at the estuarine landscape in Hood Canal (Simenstad 2000a). Interruption of contiguous migratory corridors, in this case eelgrass bands, may negatively impact juvenile chum salmon. Several activities contribute to this interruption, including armoring, diking, and overwater structures.

Dabob Bay is thought to be especially important summer chum salmon, and the central and northern regions of Hood Canal yield the majority of pocket estuaries. Returning adult chum salmon will most likely experience similar issues with the depressed D.O. levels, as do adult Chinook.

We refer the reader to the Hood Canal/Eastern Strait of Juan de Fuca Summer chum recovery plans at **http://www.wa.gov/hccc/about.htm** and **http://wdfw.wa.gov/fish/chum/chum-5b.htm** for more information.

Anadromous Bull Trout – The bull trout population from the Skokomish is depressed and at risk of extirpation as a result of reduced numbers and fragmentation (USFWS 2004). Due to the Skokomish dams, the altered sediment size and patterns has increased erosion on the outer delta and increased deposition on the inner edge of the delta (USFWS 2004). As a result, the biological productivity of the intertidal zone within the estuary has been reduced, as has the eelgrass area of which herring require for spawning (USFWS 2004). Herring are an important prey item for bull trout, and because of the issues described above, foraging opportunities have been reduced in the Skokomish estuary (USFWS 2004). Furthermore, the dams on the Skokomish River have had effects that have reduced the available spawning and rearing habitat (USFWS 2004).

Table 6-14. Recommended protection actions for Hood Canal

Protection Action	Benefit to Natal Chinook	Benefit to Other (non-natal) Chinook	Benefit to summer chum, bull trout, other fish
Aggressive protect areas, especially shallow water/low gradient habitats and pocket estuaries, within 5 miles of the Skokomish delta (and the deltas of the composite populations from the Dosewallips, Duckabush and Hamma Hamma).	Sustained feeding, growth, refuge, osmoregulation and migration functions for Skokomish and composite central Hood Canal populations	Sustained feeding, refuge and migration functions for other populations	Sustained feeding, growth, refuge, osmoregulation functions for summer chum and anadromous bull trout and other species
Protect small freshwater tributary regions	Sustained feeding, osmoregulation and refuge functions for Hood Canal populations	Sustained feeding, osmoregulation and refuge functions for other Puget Sound populations	Sustained feeding, osmoregulation and refuge functions for summer chum and anadromous bull trout
Protect against catastrophic events	Sustained feeding, growth and migration functions for Hood Canal populations	Sustained migration functions for other populations	Sustained feeding, growth and migration functions for summer chum and anadromous bull trout
Aggressively protect functioning drift cells and feeder bluffs that support eelgrass bands and depositional features along the entire eastern shoreline and the western shoreline north of Point Whitney, including Dabob and Quilcene bays. Counties should designate these shorelines for the highest level of protection within shoreline master programs and critical areas ordinances and pass strong policies limiting increased armoring of these shorelines and offering landowner incentives for protection.	Sustained feeding, growth, refuge and migration functions for Hood Canal populations	Sustained feeding, growth, refuge and migration functions for other populations	Sustained feeding, growth, refuge and migration functions for summer chum and anadromous bull trout

Table 6-15. Recommended improvement actions for Hood Canal

Improvement Action	Benefit to Natal Chinook	Benefit to Other (non-natal) Chinook	Benefit to summer chum, bull trout, other fish
Achieve and maintain adequate dissolved oxygen levels, including avoidance of further stormwater loadings and NPDES discharge loadings. Consider wastewater reclamation and reuse retrofits for all sewage discharges from wastewater plants into lower Hood Canal	Decreased risk of hypoxia-induced mortality	Decreased risk of hypoxia-induced mortality	Decreased risk of hypoxia-induced mortality
Aggressively promote shellfish environmental codes of practice	Improved feeding, refuge and migration functions for Hood Canal populations	Improved feeding, refuge and migration functions for other populations	Improved feeding, refuge and migration functions for summer chum and anadromous bull trout
Restore the Skokomish River delta by removing dikes, insuring adequate overbank flooding within the floodplain and adequate freshwater inflow from the watershed	Improved feeding, growth, refuge, osmoregulation and migration functions for Skokomish and composite central Hood Canal populations	Improved feeding, refuge and migration functions for other populations	Improved feeding, growth, refuge, osmoregulation functions for summer chum and anadromous bull trout and other species
Aggressive restore areas, especially shallow water/low gradient habitats and pocket estuaries, within 5 miles of the Skokomish delta (and the deltas of the composite populations from the Dosewallips, Duckabush and Hamma Hamma)	Improved feeding, growth, refuge, osmoregulation and migration functions for Skokomish and composite central Hood Canal populations	Improved feeding, refuge and migration functions for other populations	Improved feeding, growth, refuge, osmoregulation functions for summer chum and anadromous bull trout and other species
Increase tidal prism and estuarine connectivity (i.e., all distributaries) at all Highway 101 river crossings to benefit natal and non-natal populations of Chinook and Hood Canal/Eastern Strait of Juan de Fuca Summer chum salmon.	Improved feeding, growth, refuge, osmoregulation and migration functions for Skokomish and composite central Hood Canal populations	Improved feeding, refuge and migration functions for other populations	Improved feeding, growth, refuge, osmoregulation functions for summer chum and anadromous bull trout and other species